



Global Warming: What Does It Mean for New England?

A report on the June 26, 1997 EPA Regional Conference sponsored by the EPA Office of Policy, Planning and Evaluation, Office of Economy and Environment



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● EPA Launches Global Warming Meetings

To a standing-room-only audience in Boston, the U.S. Environmental Protection Agency opened the first in a series of regional conferences to inform the public about global warming. On June 26, 1997, close to 200 people heard John P. DeVillars, EPA's regional administrator for New England, kick off the one-day event with a far-sighted agenda for action.



(L-R) EPA Assistant Administrator David Gardiner, New Hampshire Environmental Commissioner Robert Varney, and EPA Regional Administrator John DeVillars answer questions from the audience.

Norah Daakin Davis, Waste Policy Institute

"Information is power," said DeVillars, "and we seek to empower all of us with a greater understanding of the risks, impacts, and policies associated with climate change."

In the meeting's keynote address, EPA Assistant Administrator David Gardiner hailed the conference as "an outstanding first step to public discussion on global warming."

"Global warming is the pivotal issue of our time," Gardiner added.

Articles on the conference appeared in the *Boston Globe* and *Providence Journal-Bulletin*. The ABC affiliate in Boston also covered the EPA meeting.

Eighteen organizations co-sponsored the conference. Sponsors and participants represented the six states—Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island—that comprise EPA's New England region.

Participants included representatives from New England's utility industry and Fortune 500 companies such as Polaroid and Gillette. Also represented were the insurance giants Hancock, Aetna, Prudential, Travelers, and Mass Mutual—all New England companies. Additional representatives from the business sector included officials from companies that develop solar power and other renewable energy technologies.

Joining the business sector were leaders from environmental organizations, scientists from top universities, state and local government officials, city planners, physicians and public health officials,

attorneys from prominent law firms, environmental consultants, and private individuals concerned about the global warming issue.

Questions raised by the audience suggest the wide range of viewpoints represented. John Quinn, of the Massachusetts Petroleum Council, expressed doubts about the science that links global warming to human activities such as burning fossil fuels to power cars, homes, and factories.

While uncertainties about the science remain, the speakers presented the best and most current information. Joel D. Scheraga, director of EPA's Climate and Policy Assessment Division, summarized the goals of the conference: "We are trying to articulate what we know, how well we know it, and what we don't know."

Impacts on New England

EPA Regional Administrator DeVillars and Robert W. Varney, commissioner of the New Hampshire Department of Environmental Services, voiced some of the reasons for concern.

Because of sea level rise associated with global warming, said DeVillars, "familiar landscapes from Eastport, Maine, to Long Island Sound could be changed in almost unimaginable ways."

Who Will Pay?

Commissioner Varney asked who will pay for the impacts of erosion on New Hampshire's 17 miles of coastline—mostly public beaches.

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Global Warming— An Action Agenda for New England

Global Warming reports the results of a conference sponsored by the U.S. Environmental Protection Agency entitled, "Global Warming: What Does It Mean for New England?" The conference took place on June 26, 1997, in Boston, Massachusetts.

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For more information about the conferences, visit the U.S. Environmental Protection Agency's global warming Web site at: <http://eis.wpi.org/epaworkshops/>.

In addition, EPA publishes a number of fact sheets about global warming and energy conservation. Call EPA's Fax-On-Demand Service (202-260-2860) or access EPA's global warming Internet site at <http://www.epa.gov/globalwarming>.

On June 26, 1997, the New England office of the U.S. Environmental Protection Agency introduced an aggressive multidisciplinary initiative to reduce greenhouse gas emissions and reverse the impacts of global climate change.

A Federal Response: Getting Our House in Order

This summer, the General Services Administration issued a bid to purchase bulk power for New England's federal facilities. Under EPA's leadership, the RFP includes a "clean power" choice—4 percent of the power supplied will be from renewable resources, thereby creating significant new demand for renewable energy in New England. This RFP will leverage the government's buying power to bring state-of-the-art energy conservation strategies and renewable resources to our buildings.

By June 1998, EPA New England, in conjunction with the General Services Administration, the Department of Energy, and other federal agencies, will complete an inventory of greenhouse gas emissions from federal facilities in New England, and by December, 1998, finalize New England's first Climate Change Action Plan detailing how New England's federal facilities will stabilize greenhouse gas emissions at 1990 levels by 2005.

By 1999, 50 percent of new fleet vehicles purchased will have the capacity to run on alternative fuels. EPA will assist and encourage all federal agencies in the region to purchase and use clean fuel vehicles.

Education and Information to Effect Change

We will make available to every student, teacher, and parent in New England clear, concise, and easy-to-understand educational materials on global warming. These materials will be easily accessible on the Internet and in every public library in New England by December 1997.

The Environmental Agency in each New England state will be furnished with clear concise information on global warming—educational videos, print materials, and slide shows—to facilitate outreach to stakeholders and the public.

Collaboration among the New England States

EPA has launched the New England Global Warming Network (a collaboration of EPA, DOE, and state environmental, energy, and transportation agency officials). By June 1998, all six states will have created a comprehensive greenhouse gas inventory. Further, by the end of 1998, the network will identify a comprehensive set of strategies to stabilize greenhouse gas emissions.

Further, by September 1998, each New England state will have measures in place to ensure that methane from all large landfills is either flared or

recovered for energy production, thereby reducing atmospheric releases of this potent greenhouse gas.

Expand Business/Industry Participation in EPA Voluntary Programs

EPA will add 50 million square feet of energy-efficient real estate by December 1998, reducing CO₂ emissions in New England by an additional 73 million pounds. This will be accomplished by increasing the number of participants in EPA's GREEN LIGHTS® and ENERGY STAR® programs. To date, more than 200 participants totaling 284 million square feet of space have switched to energy-efficient technologies, reducing regional CO₂ emissions by 417 million pounds each year.

By December 1998, EPA will increase by 50 percent—to almost 200—the number of New England business participants in EPA's flagship source reduction and recycling program, "WasteWi\$e." This program seeks to limit wastes from landfilling, thereby reducing the formation of harmful methane gas produced by landfills.

In addition, our expanded source reduction and recycling programs with the Northeast Recycling Council to expand office paper recycling, and a new food waste composting program with the Center for Ecological Technology will eliminate an additional 10,000 metric tons carbon equivalent (MTCE) by the end of 1999.

Transportation

30 percent of the greenhouse gas emissions in the United States come from cars, trucks, and other vehicles. EPA, through the Clean Air Partners program, is helping make Logan International Airport a world model for the use of clean fuel vehicles—for both passenger transportation and for airplane service vehicles.

Building on the success at Logan over the next year, we will expand the use of clean fuel vehicles in Portland, Maine, including:

- Develop legislative incentives to facilitate increased use of clean alternative fuels, including electric, natural gas, and propane vehicles.
- Introduce up to 10 propane-powered vehicles to private companies with fleets in greater Portland.

And at the Foxwoods Casino in Ledyard, Connecticut:

- Establish a refueling infrastructure for compressed natural gas (CNG).
- Introduce four CNG passenger shuttle buses.

Efforts to reduce greenhouse gas emissions and control global warming involve each of us. The June 1997 symposium, "Global Warming: What Does it Mean for New England?" laid the foundation for change. We will continue to build using the bricks and mortar of these local, state, and business programs.

● EPA Launches Global Warming Meetings - continued

Tidal marshes, which New Hampshire has been working to restore, are also at risk. Varney again asked, "Who will pay?"

Public and private investments along the New England coast face an uncertain future. The \$1 billion improvement program at Logan Airport, for example, and the recent \$4 billion capital investment in the Deer Island sewage treatment facility could be lost investments "as the sea threatens to rise around them," said DeVillars.

Recreational fishing, a billion-dollar industry in New England, could be sharply affected as rising temperatures lead to total loss of trout habitat in southern New England by the year 2100.

The \$14 billion tourist industry in New England could incur significant losses. Warmer winters could lead to a shorter ski season. The fall foliage displays that attract tourists from all over the nation could end as drier summers drive out the red maples and oaks that make New England autumns so vibrant.

Global Warming Is Now Commissioner Varney recently sponsored a successful resolution committing state environmental commissioners across the country to addressing global warming aggressively.

"To me, the time frames of global climate change seemed abstract and unreal," said Varney, "until I realized that my two young children—aged five and seven—will be adults in their fifties by the year 2050. We need to face up to tough decisions. The sooner we do that, the better off we will be, and the better off our children will be." ●



Brad Hurley, Waste Policy Institute

Robert Varney asks, "What are the costs of global warming, and who will pay those costs?"

● Challenging or Devastating?

Looking ahead, most experts believe that the world will warm by 1.8 to 6.3 degrees Fahrenheit during the next century. The difference between 2 degrees and 6 degrees "is the difference between a challenging situation and a devastating situation," said David Rind, of Columbia University and the NASA Goddard Institute for Space Studies. Rind is one of two leading climate scientists who addressed the conference.

Rind, a contributing author to the Intergovernmental Panel on Climate Change's scientific assessments, told the audience that research today is focused on reducing uncertainties about the climate system's response to changes in greenhouse gases. "Nobody doubts the concept of greenhouse warming," Rind said. "The real questions are: How much will it warm, how fast will it warm, and where will it warm?"

So far, the earth's average temperature has risen by about 1 degree Fahrenheit since 1880. Rind explained that it is unclear how much of the warming is due to human activity. Changes in solar output and other factors may be partly responsible. The picture also is clouded by sulfate aerosols, which cool the climate by reflecting radiation back out to space. The burning of fossil fuels currently adds three times the natural level of sulfate aerosols to the atmosphere.

If governments enact pollution controls that reduce sulfate aerosols without also reducing carbon dioxide, this could exacerbate global warming, Rind warned.

Most people could deal with a warming of 2 degrees Fahrenheit or less over the coming century. But if the globe warms by 5 or 6 degrees Fahrenheit, "all the effects will happen—in spades," Rind said.

The other climate scientist, David R. Easterling, a research meteorologist with the National Climatic Data Center in Asheville, North Carolina, presented findings that indicate that long-term global and regional changes have occurred in temperature, precipitation, cloud cover, and extreme weather events.

The northeastern United States has seen a rise in daytime maximum temperatures during the 20th century, Easterling said, along with higher nighttime minimum temperatures and an increase in precipitation.

Easterling presented a "Greenhouse Index" for the United States that combines five meteorological indicators of climate change such as percent of the United States with above-normal temperatures. Easterling concluded that the index has increased since 1960, with a "fairly strong" increase after 1975. ●



Brad Hurley, Waste Policy Institute

NASA's David Rind: the impacts of global warming could be either "challenging or devastating."



Norah Deakin Davis, Waste Policy Institute

Meteorologist David Easterling: the indicators of climate change have increased "fairly strongly" since 1975.

"There's going to be change because of global warming. Some people can adapt to change, but others may not want to. Like the people who live in New Hampshire because they like it the way it is."

Janine Bloomfield
Staff Scientist
Environmental
Defense Fund

● The Real Problem

The greenhouse effect is a beneficial natural phenomenon that makes the Earth habitable. The problem is that the concentrations of greenhouse gases in the atmosphere are increasing because of human activities, trapping more heat.

Carbon dioxide emissions to the atmosphere are rising at an unprecedented rate. As explained by Dr. Joel D. Scheraga, director of EPA's Climate and Policy Assessment Division, carbon dioxide went from 280 parts per million (ppm) at the beginning of the Industrial Revolution to 360 ppm today.

By the year 2060, carbon emissions will double from pre-industrial levels to 560 ppm. But then in a mere four decades, by the year 2100, they will

rise to 720 ppm. This increasing rate of emissions is the real problem.

"There have been large fluctuations over the past 160,000 years," said Scheraga, "but nothing like what we're talking about for the year 2100." ●



EPA's Joel Scheraga: greenhouse gas emissions are increasing at an unprecedented rate.

Brad Hurley, Waste Policy Institute

● Beech Trees Move Slowly

Intensive study of a former New England farm revealed that it took 80 years for existing beech trees in nearby undisturbed forestland to move 100 feet into a plowed field. Trees can take a long time to establish themselves in the fragmented forest typical of New England.

If global warming leads to rapid temperature and precipitation changes, tree species that are slow to migrate to new habitat will be in trouble.

"The key is resilience," said Steven P. Hamburg, of Brown University, "how fast an ecological system can bounce back. If the rate of change is faster than the time scale in which ecological systems occur, then ultimately those systems will collapse."

Hamburg cited local temperature data for Hanover, New Hampshire, where the average has risen 1.8 degrees Fahrenheit over the past 120 years. This rapid rate of change eventually could turn New England from deciduous forest to savanna similar to eastern Kansas, where trees are found in patches.

New Englanders have a strong sense of place, and Hamburg asked whether they would like the changes that may occur as temperatures rise. For example,

the maple syrup industry may be at risk, based on two assumptions that are both reasonable—a 3.6 degree Fahrenheit increase and twice as much warming at night as during the day. Under this scenario, the flow of sap that New Englanders in the White Mountains rely on to produce maple syrup could drop enough that many producers might go out of business.

"We don't have a clear picture of the impacts on New England forests," Hamburg told the conference. "But we can see that these ecosystems are highly vulnerable, especially because of their long history of disturbance and the current impacts of acid rain." ●



Steven Hamburg, of Brown University, describes the vulnerability of New England ecosystems to global warming.

Norah Deakin Davis, Waste Policy Institute

Upcoming Conferences

The second regional conference sponsored by the U.S. EPA, "Global Climate Change: What Does It Mean for the Midwest and the Great Lakes?" will be held September 10, 1997, at the Clarion-Executive Plaza Hotel in Chicago, Illinois.

"Global Climate Change: Impacts for the Southeast," the third EPA regional conference, will convene September 16-17, 1997, at the Renaissance Atlanta Hotel in Atlanta, Georgia.

"Climate Change: What Does It Mean for the Central Southwest?" will be held October 30, 1997, at The Fairmont Hotel in Dallas, Texas.

For more information, contact Monica Duda, Waste Policy Institute, (703) 247-2410.

● Utilities Doing Their Part

Utilities are stepping up to the plate and hitting home runs when it comes to reducing greenhouse gas emissions.

“We’re part of the problem,” said Andrew H. Aitken, vice president of New England Power Company, “but we can also be part of the solution.”

Aitken showed how technological innovation is changing the power industry dramatically. Coal is a lower-cost fuel, but that advantage is offset by the improved efficiency of combined-cycle electric generating plants powered by natural gas. “That is

the economic bottom line,” said Aitken. “The environmental bottom line is that



Norah Deakin Davis, Waste Policy Institute

(above) Andrew Aitken, vice president of New England Power Company, describes how technological innovation is changing the power industry dramatically.

(right) Lewis Milford, of the Conservation Law Foundation, praises Massachusetts for enacting utility deregulation legislation that encourages renewable technologies.



Norah Deakin Davis, Waste Policy Institute

natural gas power plants produce one-third of the carbon emissions generated by coal plants.”

Since 1990, the use of natural gas in New England has increased substantially. It now accounts for 15 to 20 percent of the electricity generated in the region. “We will see in my estimation an almost wholesale retirement over the next 10 years of existing oil units in New England,” said Aitken. “Economic forces are heading us in the direction we want to go.”

Aitken and Lewis Milford, of the Conservation Law Foundation, a nonprofit devoted to the wise use of New England’s natural resources, praised Massachusetts for enacting deregulation legislation that encourages renewable technologies.

The legislation, endorsed by a broad group of stakeholders, provides for an investment fund of about \$45 million a year that is expected to leverage private capital of another \$100 to \$200 million. The utility restructuring legislation also includes demand-side programs to encourage zero growth in energy consumption.

In response to an audience question, Milford noted that new energy technologies have a historical turnover of 50 years. “But I think it will happen more rapidly now, thanks to the end of the monopoly system. We think that coal is much more vulnerable than most people believe. It has reached the end of its efficiency parameters, but gas is just beginning.” ●

“With other utilities fighting some of the regulations, we want to be one of the leaders in the fight against global warming.”

Dennis E. Welch
Northeast Utilities
Service Company

Fuel Cell Success Story

The world’s only fuel cell operating on methane gas collected from a landfill has attracted utility officials from as far away as Russia to Groton, Connecticut, where the power plant is located.

Landfill gases are the largest anthropogenic source of methane, a potent greenhouse gas.

At present, the power plant’s exhaust heat and carbon dioxide are vented to the atmosphere. William L. Stillinger, of Northeast Utilities, the region’s largest electric utility, told the conference that plans are to divert the waste stream to a commercial greenhouse to grow hydroponic produce.

Also under discussion is a plan to sell emissions credits from the fuel cell to Canadian utilities. Potential stumbling blocks include verification of baseline emissions by a third-party independent reviewer, verification of emission reductions, and establishment of a registry for accounting.

“We are at the letter of intent stage,” said Stillinger. “We are not waiting for the government. We are going to just do it.”



Courtesy of Northeast Utilities System

William Stillinger (right), of Northeast Utilities, describes the world’s only fuel cell operating on methane collected from a landfill. The power plant (above) is located in Connecticut.



Norah Deakin Davis, Waste Policy Institute

● The Road to Kyoto—and Beyond

Calling global warming the “pivotal issue of our time,” EPA Assistant Administrator for Policy, Planning and Evaluation David Gardiner described how the United States government views the risk of climate change and what it sees as appropriate elements of an international agreement to limit emissions.

Gardiner told the conference that the U.S. position on global warming is driven by three key principles:

Sound Science

First, the U.S. government believes that *the science is truly compelling.*

“We are listening to the world’s leading scientists on this issue,” Gardiner said. In addition to the conclusions of the United Nation’s Intergovernmental Panel on Climate Change, Gardiner cited recent letters to President Clinton signed by 21 ecologists and more than 2,400 other American scientists urging action on global warming.

“We have heard from the scientists that there is now a discernible human impact on the climate,” Gardiner said. “They anticipate mostly adverse effects, with significant loss of human life associated with climate change.”

These scientists are “today’s Paul Reveres,” Gardiner said. “They’re saying that global warming is coming, and the question is whether we stay in bed or get up and go to the village green.”

While recognizing that uncertainties exist, Gardiner noted that uncertainty should not be used as an excuse to delay action. “We believe the science is strong enough, and in fact it would be foolhardy and irresponsible not to act.”



EPA’s David Gardiner describes the U.S. position on global warming.

Norah Deakin Davis, Waste Policy Institute

“Climate change is the biggest environmental issue we’ve ever faced.”

David Gardiner
Assistant Administrator
for Policy, Planning
and Evaluation
U.S. Environmental
Protection Agency

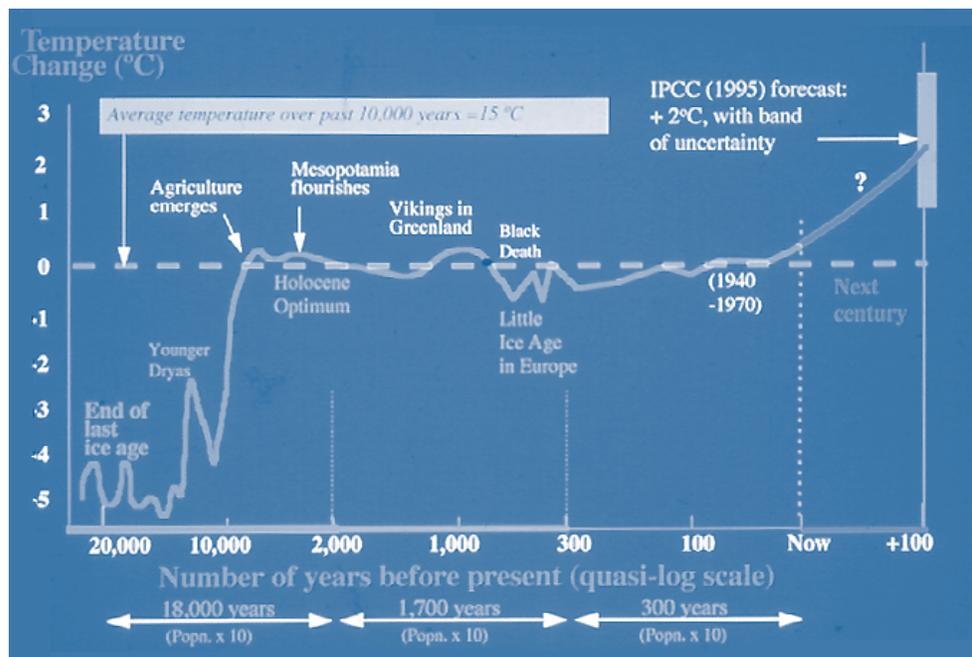
Good Economics

Second, the U.S. believes that *there are many economic benefits to be gained by acting.*

Because 85 percent of U.S. greenhouse gas emissions come from burning fossil fuels, our overall strategy should be to improve energy efficiency. In addition, we should encourage the use of renewable energy sources. “We believe that in doing so, consumers can save money and at the same time reduce global warming emissions,” Gardiner said.

Furthermore, he noted that there is a “vast global marketplace” for energy efficiency and renewable energy technologies that U.S. businesses can tap.

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One of the conference speakers, Jonathan Patz, used this graph to illustrate historic temperature records and projections for the next century. Courtesy of A.J. McMichael, *Planetary Overload* (Cambridge University Press, 1995).

● The Road to Kyoto—and Beyond (continued)

Many of the nation's economists agree. Last March, Gardiner told the audience, some 2,500 economists wrote to President Clinton urging him to take action on climate change. They pointed to the economic benefits to be gained if policies are designed in the right direction.

A New Approach

Third, the United States recognizes that *global warming is a fundamentally different issue than anything we have tackled before.*

"When you think about all the sources of greenhouse gases, the range of possible effects, the global areas that are potentially affected, and the time frames over which those effects are likely to be felt, it becomes clear that climate change is the biggest environmental issue we've ever faced," Gardiner said.

Global warming thus requires new ways of thinking about policy options. "There's no silver bullet," Gardiner said. "The potential solutions are as multifaceted as the problem itself, and that's part of the challenge."

Climate change also is unique because it is global. With traditional air pollution problems, the people most affected are downwind of the source. "With global warming," Gardiner said, "everybody is downwind."

Any lasting, effective response must be global in nature. By the year 2050, developing countries are expected to emit more global greenhouse gases than the industrialized world.

Forging an Agreement

Under the U.N. Framework Convention on Climate Change, developed countries set a goal of returning their emissions to 1990 levels by the year 2000. Gardiner reported that almost all developed nations, including the United States, will fail to meet this goal. Negotiations currently are underway to strengthen the treaty with legally binding and enforceable targets that are tough, meaningful, and realistic. The talks will culminate in a meeting of the parties in Kyoto, Japan, in December.

"We know that the voluntary approach wasn't enough," Gardiner told the audience.

The United States is analyzing the science, economics, and policy options, and is planning "an extensive round" of public discussions to determine an appropriate target and timetable. Gardiner noted that the United States expects to be a "real leader" and will go into the discussions in Kyoto with "very strong and aggressive proposals."

Flexibility is Key

The United States advocates a flexible, market-based approach that makes both economic and environmental sense. Gardiner said this approach will allow individual countries to choose their own most cost-effective strategies for reducing emissions.

The U.S. government also favors allowing countries that reduce their emissions early to earn credit by

banking those emissions. Those that have trouble meeting their commitments could borrow, with an interest payment, emissions reductions from a future time frame. International emissions trading, modeled after the U.S. success with the Clean Air Act, is an important element of the Clinton Administration's proposal.

Developing World Must Act

Although developing countries should not be required to undertake the same commitments as industrialized nations, Gardiner said the United States believes those countries must take a more active role. Developing countries could start by enacting profitable "no regrets" steps to reduce emissions, and set a date by which they would establish their own target and timetable for legally binding emissions reductions. Rapidly developing countries such as Mexico and South Korea should be asked to take on additional climate commitments as their economies grow.

Hurdles Ahead

Gardiner advised the audience that if the parties succeed in Kyoto, the United States will face a further challenge in convincing the Senate to ratify the agreement. House approval also will be required for any implementing legislation that is needed.

"It's my sense that ratification of this international agreement is likely to be front-page news for months, if not for years," Gardiner said. "I think it's likely to make the debate over ratification of the North American Free Trade Agreement (NAFTA) look like a grade-school food fight by comparison."

Still, Gardiner said he feels "more hopeful now than ever" that the United States will be able to support and implement a strong climate commitment. Americans are beginning to understand the health and environmental implications of global warming, and businesses are starting to seize the economic opportunities presented by national and international responses to global warming.

"I'm convinced that the more the American people understand what could be lost if we don't act, and what could be gained if we do, the more likely they are to support an international agreement." ●

"What to do about global warming is what I'm interested in. What does each of us as consumers have to do? That is the bottom line."

Paul Bartlett
Goldman Environmental
Consultants



Norah Deakin Davis, Waste Policy Institute

Questions from the audience ranged from queries about the need for lifestyle changes to the need for life-cycle costing, as well as numerous other issues.



Norah Deakin Davis, Waste Policy Institute

Alan Noguee, of the Union of Concerned Scientists, reports that renewable technologies can promote economic development in New England.

● Renewables: Their Time Has Come

The price for electricity from wind turbines has declined 80 to 90 percent in the last two decades. It is now 5 to 6 cents per kilowatt hour and could go as low as 3 to 3.5 cents. This was the good news shared by Alan J. Noguee, senior energy analyst with the Union of Concerned Scientists.

“New England has very high solar energy potential,” he added. “A study last year revealed that Massachusetts ranks fifth in the nation in terms of the break-even price for photovoltaic electricity, and the other New England states are not far behind.”

Renewable technologies can promote economic development in New England by increasing export industries and the skill base of the region’s labor force.

“Poll after poll shows that the public is more than willing to pay up to 2 percent more per month for renewables,” Noguee concluded. ●

● Spreading the Word

Like many of the attendees, Joel N. Gordes, a consultant with Environmental Energy Solutions, heard about the conference by word of mouth. “A friend sent me the announcement,” Gordes said.

He came hoping to hear the latest information. He also found a forum for sharing ideas. Gordes is working on a proposal for the insurance industry to go into the business of selling electricity, once the energy market is deregulated. “For every dollar that you are able to save off your electricity bill through conservation,” Gordes explained, “the insurance company would put that dollar in a retirement annuity for you.”

The companies could aggregate the emissions saved and sell them on the Chicago Board of Trade. That money also would go into an individual’s annuity—long-term thinking for a long-term problem. ●

● Business Perspectives

In a far-ranging discussion of the impacts that climate change could have on businesses and industries in New England, experts from various economic sectors shared their perspectives on topics ranging from insurance coverage to electricity generation.

James Russell, a vice president at the Insurance Institute for Property Loss Reduction, reported that nine insurance companies have gone out of business as a result of losses incurred from severe weather conditions similar to those that could be caused by climate change. Said Russell, “activities such as sensible land use policies, improved new construction, and the retrofitting of existing construction make good business sense.”

Bradley H. Spooner, of the New England Electric System, highlighted opportunities to reduce greenhouse gas emissions by expanding the use of renewable energy sources to give customers more choices in electricity suppliers.

According to Mary H. Novak, of WEFA Energy Services, recent impact studies indicate that carbon abatement policies, if implemented, could generate a 1.5 to 2.5 percent loss in the nation’s gross domestic product (GDP) by the year 2010. Novak added that “only a significant change in energy prices would motivate industry to increase its energy efficiency. But the net impact,” she said, “would be to reduce economic performance.” ●



Norah Deakin Davis, Waste Policy Institute

EPA’s Lucy Edmondson chairs a panel discussing innovative projects by New England companies for reducing energy use.



Norah Deakin Davis, Waste Policy Institute

EPA’s Norman Willard describes some of the nation’s 50 CCAP programs and 5,000 CCAP partners who are voluntarily reducing energy consumption.

CCAP Makes Cents

“The U.S. Climate Change Action Plan (CCAP) programs are based on technologies that are developing very rapidly, such as efficient lighting and air-handling systems that can be of tremendous value in reducing energy consumption. We encourage companies, colleges and universities, hospitals, and people in the private and public sectors to look at these technologies. They are all profit-based.

“Buildings actually account for 19 percent of all CO₂ emissions generated in this country, so if we can reduce those emissions through the CCAP profitable approach to energy upgrades, we’ve done a lot.”

Norman Willard
Region 1, U.S.
Environmental
Protection Agency

Watching for the early warning signs of global warming's health impacts and developing effective response mechanisms can lessen the risks of climate change. That was the prescription delivered by two physicians and an EPA expert on climate change.

For all of the potential health impacts—increased infectious diseases, deaths from heat waves, and risks related to worsened air and water quality—the damage can be reduced through preventive action.

Tracking seasonal conditions that set the stage for outbreaks of infectious diseases in order to alert physicians is one effective mechanism. Another is establishing municipal heat emergency plans. Strategies for heat waves include providing air conditioned shelters, buddy systems, and waivers of power cut-offs.

Lyme Disease

Dr. Paul Epstein, a faculty member of Harvard Medical School and a principal lead author of a World Health Organization book on climate change and health, pointed out that frost-free days are arriving 11 days earlier in New England than they did in the 1950s. Changes in temperature and climate affect the range in which diseases can occur. Lyme disease, for example, has a two-year life cycle, and higher winter temperatures can increase the tick populations that carry the disease.

Lyme is the most prevalent vector-borne disease in the United States. It is of concern throughout the New England region. Connecticut in particular is a hotbed of the disease.

Heat Waves

Infectious diseases and the health impacts from air and water pollution do not respect international boundaries. "We cannot stop microbes at our



Norah Deakin Davis, Waste Policy Institute

Dr. Paul Epstein, of Harvard Medical School, points out that an increase in Lyme Disease is one potential health impact of global warming.

borders or put up a wall to stop mosquitoes from Mexico," said Anne Grambsch, of EPA's Climate and Policy Assessment Division.

Grambsch stressed the scientific and social uncertainties of global warming, such as the extent of the cooling effect of clouds or the impact of telecommuting on reducing traffic-related greenhouse gas emissions.

Similar uncertainties exist for health impacts. For heat waves, for example, most available data track deaths, not morbidity. "We don't know how many people showed up in emergency rooms with heat exhaustion," said Grambsch, "or stayed at home with heat cramps, nausea, and fainting."

Malaria and Encephalitis

Dr. Jonathan Patz, a faculty member of the Johns Hopkins School of Hygiene and Public Health and a principal lead author of the WHO book, noted that a temperature change of 1 degree Fahrenheit "could

be very significant to a mosquito." As temperatures rise, the length of time needed for the malaria parasite to develop in a mosquito shortens dramatically. A person bitten by a mosquito might contract malaria who might not have become sick if the temperature was 2 degrees lower and the parasite had not yet developed.

Patz also pointed out that it is well documented that the replication rate of arboviral encephalitis, a mosquito-borne disease that is sometimes seen in New England, is temperature sensitive. ●



Norah Deakin Davis, Waste Policy Institute

(above) EPA's Anne Grambsch explains that watching for the early warning signs of global warming's health impacts and taking preventive action could reduce the damage.

(right) Dr. Jonathan Patz, of Johns Hopkins, describes the dramatic impact of temperature rise on the life cycles of the mosquitoes that carry malaria and encephalitis.



Norah Deakin Davis, Waste Policy Institute

"It's not the computer climate models, but it's the data—the signals of global warming—that's what we're talking about."

Paul Epstein, M.D.
Harvard Medical School

"We cannot stop microbes at our borders or put up a wall to stop mosquitoes from Mexico."

Anne Grambsch
U.S. Environmental
Protection Agency

● *Feeling the Heat*

The potential costs of global warming to state and local governments are “mind numbing,” said Sonia Hamel, director of air policy and planning at the Massachusetts Executive Office of Environmental Affairs.

For example, tourism is a \$5.7 billion industry in Massachusetts. Travelers flock to historic sites on Boston’s waterfront and coastal communities such as Marblehead, Rockport, and Gloucester. Sea level rise would place many of these historic treasures at risk.

More frequent and severe storms are another risk of global warming. So far this year, Boston has spent \$9.3 million on storm cleanup. An increase in storms, including winter blizzards, could place a heavy burden on town and city budgets.

Heavier storms could harm Massachusetts’ growing shellfish industry by sending “huge amounts” of runoff into coastal waters. Global warming also presents a risk to public water supplies and wetlands, potentially raising costs to communities.

Forest Impacts

Ninety years from now, New Hampshire could be 6 degrees Fahrenheit warmer than it is today, said Steven Winnett, watershed coordinator for EPA’s New England office. Models indicate that New Hampshire winters could become as much as 60 percent wetter than they are today, and summers could be as much as 60 percent drier.

According to Winnett, such changes would affect forests both directly and indirectly through the population dynamics of insects, disease vectors, incidence of windthrow, and fire. In turn, these impacts could lower the values of timber and recreation, and affect wildlife, fisheries, water, air, local economies, and communities.

Cities at Risk

Philip S. Jessup, director of the Cities for Climate Protection Campaign at the International Council for Local Environmental Initiatives, told the audience that many of New England’s cities may be vulnerable to global warming.

The urban heat island effect raises city temperatures by 5-10 degrees Fahrenheit over the surrounding countryside. This effect, together with global warming, raises the risk of heat mortalities and smog-related illnesses.

Changes in precipitation, a likely impact of global warming, could adversely affect city water supplies and sewage treatment. Inland cities that border lakes or rivers are at risk of increased flooding. Coastal cities are also vulnerable to sea level rise.

Jessup presented data for Boston showing that summer temperatures have risen by nearly 4 degrees Fahrenheit since 1900. Extreme snowfall events also have increased in the Boston area over the past 50 years.

The average level of smog-producing ozone in the Boston area has been rising over the past 10 years as well. The rise is in line with the increase in summer temperatures. Children living in cities are especially vulnerable to ozone. Jessup cited recent findings that close to 27 million children across the country are exposed to harmful levels of ozone.

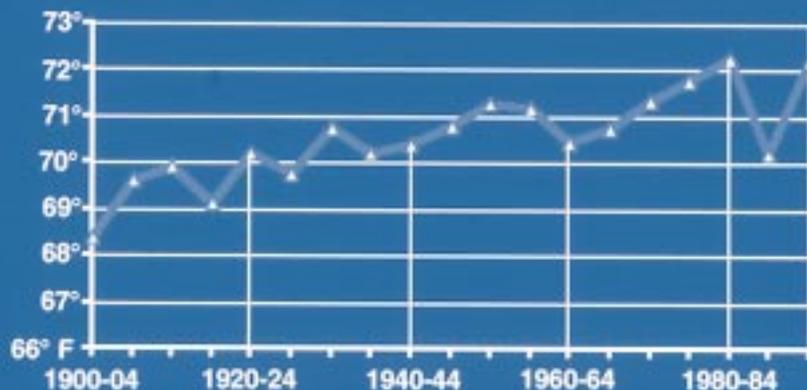
“Global warming may tend to elevate the levels of urban air pollution significantly in the future,” Jessup said, “basically offsetting and dampening a lot of the good efforts that we’ve made to reduce air pollution in the past.” ●

“The potential costs of global warming to state and local governments are ‘mind numbing.’ ”

Sonia Hamel
Director of Air Policy
and Planning
Massachusetts Executive
Office of
Environmental Affairs

100-Year Temperature Trend — Boston

5-Year Summer Months (JJA) Rolling Average, 1900-1996



Source: NOAA National Climatic Data Center

ICLEI

Compiled by ICLEI’s Cities for Climate Protection Campaign, using data from the National Climatic Data Center.

● Clean Air Needed Here

One attendee at the conference—Katherine Stewart, an environmental manager for Polaroid Corporation in Norwood, Massachusetts—has a personal reason to be concerned about global warming. She has asthma. Rising temperatures accelerate the formation of ozone smog, which can exacerbate asthma symptoms. An increase in urban heat waves might leave Stewart—and thousands of others like her—out of breath. ●

● A Coast at Risk

Climate change is not yet on the radar screen for most coastal zone managers, but it should be. That was the consensus of the speakers who described the reasons coastal communities should be concerned.

Global warming is expected to increase the rate of sea level rise and coastal erosion. Graham Giese, of Woods Hole Oceanographic Institution, noted that Massachusetts already loses 65.4 acres per year from coastal erosion.

Impacts from sea level rise, hurricanes, and nor'easters will expose more of the vulnerable New England coastline. David R. Vallee, of the National Weather Service, told the conference that storm surges of 10 to 20 feet are possible during hurricanes. Nor'easters in particular cause extensive beach erosion.

"Historically, the region moves in and out of active storm periods for nor'easters and hurricanes," said Vallee. "We are clearly in an active period. Even the smallest impact of a global warming scenario will be felt on our fragile coastline." ●

● Maine Looks Ahead

Given Maine's resource-based economy, long coastline, and a rate of sea level rise higher than the national average, the northernmost New England state may be particularly vulnerable to global warming.

James Connors, senior policy planner at the Maine State Planning Office, said that the state is taking the risks seriously and already has completed a state greenhouse gas emissions profile. Maine is now developing a global warming mitigation plan to reduce emissions.

Connors and Deirdre M. Mageean, of the University of Maine, noted that the state has established several far-sighted climate policies. Maine's coastal properties are subject to rolling easements that require structures to be moved landward as sea levels rise. In a new development prompted by deregulation of electric utilities, any provider of electricity must demonstrate that 30 percent of the power supplied comes from renewable sources. ●

● Innovative Energy Savings

Residential energy building standards, life-cycle purchasing, and police on bikes are some of the innovative greenhouse gas reduction policies described by two conference speakers.

Vermont has implemented life-cycle purchasing for state government procurements, according to William Steinhurst, director for regulated utility planning for the Vermont Department of Public Service. When the state police department wants to purchase new patrol cars, for example, it bases its choice on the full life-cycle costs of the vehicle and the fuel needed during its lifetime.

Steinhurst said that Vermont also has recently implemented residential energy building standards. Working with builders, contractors, health and environmental officials, and other stakeholders, the state's Energy Efficiency Division developed an upgrade of the 1995 national model building code. The code applies to all new construction, will be updated every three years, and has been endorsed by the state homebuilders association.

Cities Set an Example

"Municipalities have a tremendous ability to influence energy use," said Philip Jessup of the International Council for Local Environmental Initiatives (ICLEI).

Cities can cut greenhouse gas emissions in their own operations through measures such as retrofitting municipal buildings, reducing emissions from vehicle fleets, implementing trip reduction programs, and reducing the urban heat island effect by planting trees and improving the reflectivity of roofs and roads.

Many cities are working to improve efficiency in the transportation sector. Cities can reduce emissions from municipal fleets by improving fuel efficiency, optimizing travel routes, purchasing alternative fuel vehicles, and using alternatives such as bicycles, walking, and teleconferencing.

Jessup said that police bicycle patrols in Dayton, Seattle, and Toronto have improved relations between police and communities and result in "much more effective policing" than is achieved with the use of patrol cars.

In another example, Portland, Oregon, is in the process of implementing a range of transportation strategies, including a regional light rail system and measures to slow traffic and encourage walking. Jessup said that Portland's transportation strategies are so successful that the city actually has begun decommissioning some highways and turning them into urban parks. ●



William Steinhurst discusses Vermont's innovative approaches to energy efficiency.

Brad Hurley, Waste Policy Institute



Philip Jessup, of ICLEI, cites Portland's success in reducing emissions from transportation and decommissioning of highways to turn them into urban parks.

Brad Hurley, Waste Policy Institute

“We need to get small working groups together and talking about issues, for example, like the impact of global warming on commercial fishing in New England.”

Pam Person
Vice Chair, Coalition for
Sensible Energy

● Where Do We Go From Here?

At our conference, we took two first steps toward constructing an action plan for New England. Preparations for this *Global Warming* report was one, and a forceful next step was taken the following day when the New England Global Warming Network was launched.

This network of energy and environmental officials from each of the New England states and federal agencies will begin to “put meat on the bones” of the goals, targets, and action steps that I announced. We invite any state, local, or federal officials who are not yet plugged into that network to get in touch with us.

There’s lots more work to be done. We’re going to need your help every step of the way. We invite your thoughts as to what we should be doing and how you would like to be involved.

— *John P. DeVillars*
Regional Administrator, U.S. Environmental Protection Agency



John P. DeVillars

Norah Deakin Davis, Waste Policy Institute

Conference Speakers

Andrew Aitken, Vice President, Environment and Safety, New England Electric System

Peg Brady, Executive Director, Massachusetts Office of Coastal Zone Management

Tom D’Avanzo, Deputy Manager, Assistance and Pollution Prevention Unit, U.S. Environmental Protection Agency, Region 1, New England

John P. DeVillars, Regional Administrator, U.S. Environmental Protection Agency, Region 1, New England

David R. Easterling, Ph.D., Research Meteorologist, National Oceanic and Atmospheric Administration, National Climatic Data Center

Lucy Edmondson, Transportation Policy Specialist, Office of the Regional Administrator, U.S. Environmental Protection Agency, Region 1, New England

Paul Epstein, M.D., M.P.H., Associate Director, Center for Health and the Global Environment, Harvard Medical School

John P. Foster, Communications Officer, Office of Economy and Environment, U.S. Environmental Protection Agency

Frank Gable, Research Fellow, Harbor and Coastal Center, University of Massachusetts, Boston

David Gardiner, Assistant Administrator for Policy, Planning and Evaluation, U.S. Environmental Protection Agency

Graham Giese, Ph.D., Research Specialist, Woods Hole Oceanographic Institution

Anne Grambsch, Senior Economist, Climate and Policy Assessment Division, U.S. Environmental Protection Agency

Cynthia Greene, Environmental Scientist, U.S. Environmental Protection Agency, Region 1, New England

David Guest, StarTrack Coordinator, Office of Environmental Stewardship, U.S. Environmental Protection Agency, Region 1, New England

Steven P. Hamburg, Ittleson Associate Professor, Brown University, Center for Environmental Studies

Sonia Hamel, Director of Air Policy and Planning, Massachusetts Executive Office of Environmental Affairs

Phillip S. Jessup, Director, Cities for Climate Protection, International Council for Local Environmental Initiatives, Toronto, Canada

Bruce C. Larson, Director of School Forests, Yale School of Forestry and Environmental Studies

Gerry Levy, Deputy Director, Office of Environmental Stewardship, U.S. Environmental Protection Agency, Region 1, New England

Deirdre M. Mageean, Ph.D., Associate Professor of Public Administration, University of Maine

Lewis Milford, J.D., Director, Energy Project, Conservation Law Foundation

Alan Noguee, Senior Energy Analyst, Union of Concerned Scientists

Mary Novak, Senior Vice President, WEFA Group, Inc.

Jonathan A. Patz, M.D., M.P.H., Director, Program on Health Effects of Global Environmental Change, Division of Occupational and Environmental Health, Johns Hopkins School of Hygiene and Public Health

Rutherford H. Platt, Ph.D., Professor of Geography, University of Massachusetts at Amherst

David Rind, Ph.D., Climate Change Research Scientist, NASA/Goddard Institute for Space Studies

James W. Russell, Ed.D., Vice President, Program Coordination, Insurance Institute for Property Loss Reduction

Joel D. Scheraga, Ph.D., Division Director, Climate and Policy Assessment Division, U.S. Environmental Protection Agency

Bradley H. Spooner, J.D., P.E., New England Electric System

William Steinhurst, Ph.D., Director for Regulated Utility Planning, Vermont Department of Public Service

William L. Stillinger, Director, Research and Environmental Planning, Northeast Utilities

David R. Vallee, Service Hydrologist, National Weather Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Robert W. Varney, Commissioner, New Hampshire Department of Environmental Services

David Webster, Manager, Office of Environmental Stewardship, U.S. Environmental Protection Agency, Region 1, New England

Norman Willard, Assistance and Pollution Prevention Unit, Office of Environmental Stewardship, U.S. Environmental Protection Agency, Region 1, New England

Steven Winnett, Ph.D., Watershed Coordinator, U.S. Environmental Protection Agency, Region 1, New England, Environmental Protection Team



U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460